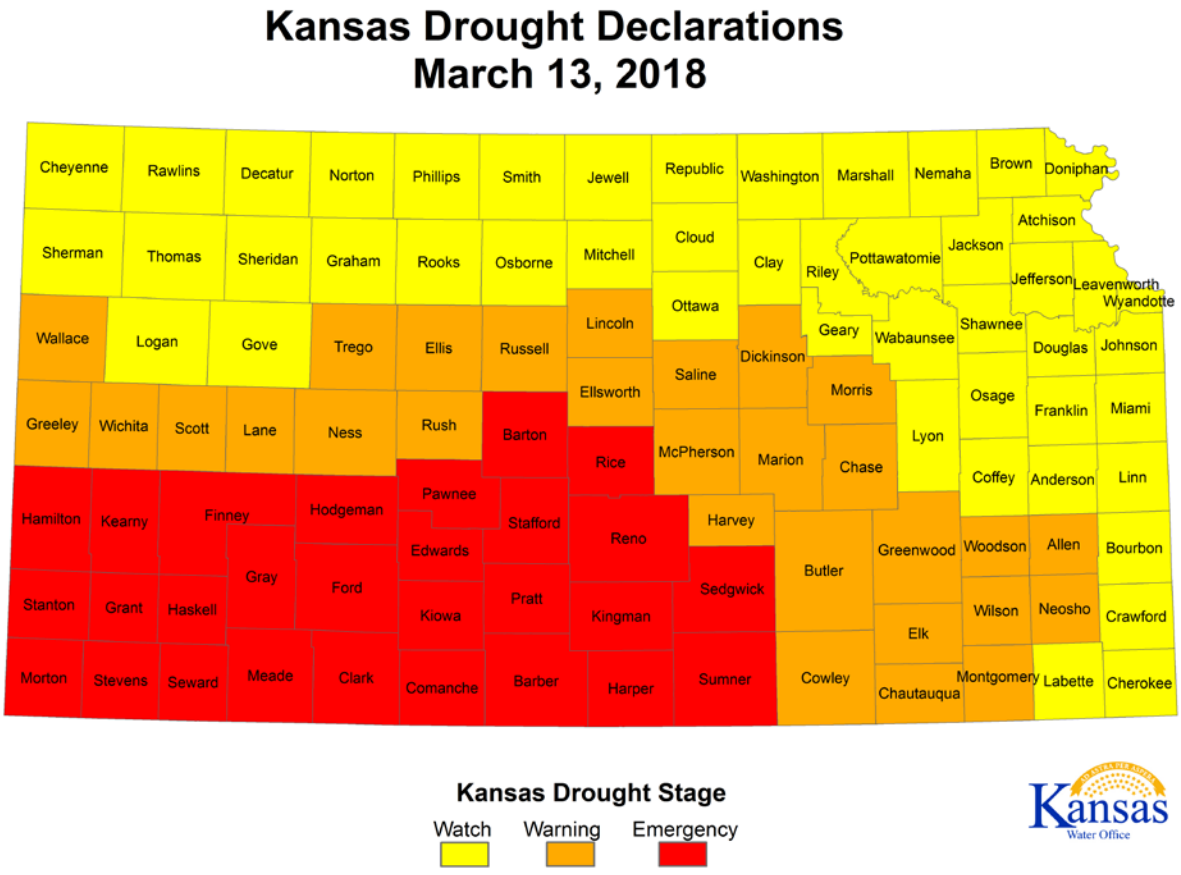
Kansas Water Office

KANSAS CLIMATE and DROUGHT UPDATE – Mid March 2018 Summary

March 13, 2018 Governor Orders Drought Declaration for all Kansas Counties - Executive Order 18-11
Governor Jeff Colyer, MD issued Drought Declarations for Kansas counties with Executive Order 18-11. The declaration includes all 105 counties placing 28 counties in emergency status, 29 into a warning status and 48 into a watch status.



Drought Watch counties: Anderson, Atchison, Bourbon, Brown, Cherokee, Cheyenne, Clay, Cloud, Coffey, Crawford, Decatur, Doniphan, Douglas, Franklin, Geary, Gove, Graham, Jackson, Jefferson, Jewell, Johnson, Labette, Leavenworth, Linn, Logan, Lyon, Marshall, Miami, Mitchell, Nemaha, Norton, Osage, Osborne, Ottawa, Phillips, Pottawatomie, Rawlins, Republic, Riley, Rooks, Shawnee, Sheridan, Sherman, Smith, Thomas, Wabaunsee, Washington, Wyandotte

Drought Warning counties: Allen, Butler, Chautauqua, Chase, Cowley, Dickinson, Elk, Ellis, Ellsworth, Greeley, Greenwood, Harvey, Lane, Lincoln, Marion, McPherson, Montgomery, Morris, Neosho, Ness, Rush, Russell, Saline, Scott, Trego, Wallace, Wichita, Wilson, Woodson

Drought Emergency counties: Barber, Barton, Clark, Comanche, Edwards, Finney, Ford, Grant, Gray, Hamilton, Harper, Haskell, Hodgeman, Kearny, Kingman, Kiowa, Meade, Morton, Pawnee, Pratt, Reno, Rice, Sedgwick, Seward, Stafford, Stanton, Stevens, Sumner

General Overview

- U.S. Drought Monitor indicates almost 20% of Kansas in extreme drought, with severe drought covering about 56% of the state. Severe drought expanded the week ending March 13 to include all or portions of another 10 counties in eastern Kansas.

- Drought Outlooks favor continuing drought conditions for the majority of Kansas through March

- Wildfire danger remains high, due to dry conditions, availability of fuel and winds. Over 27,000 acres burned in the first 7 days of March. Additional fires reported through March 14.

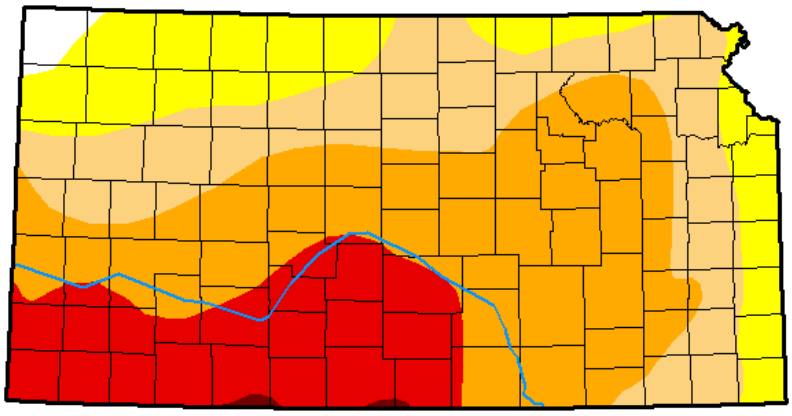
- Water Rights above the USGS gage on the Little Arkansas River at Alta Vista have been administrated under Minimum Desirable Streamflow (MDS) since August 10, 2017.

General Conditions

First two weeks of March saw continued deterioration in drought related conditions to consider nearly 82% of Kansas in some level of drought by U.S. Drought Monitor evaluation, Extreme drought conditions now covers almost 20 percent of the state. Severe drought has expanded to 56% of the state while moderate drought covers an additional 26 percent of the state. The fire danger continues with numerous wildfires occurring.

U.S. Drought Monitor

Kansas



March 13, 2018

(Released Thursday, Mar. 15, 2018)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	1.22	98.78	81.77	56.19	19.33	0.30
Last Week *03-06-2018*	1.23	98.77	76.69	44.45	18.82	0.34
3 Months Ago *12-12-2017*	0.89	99.11	20.58	1.85	0.00	0.00
Start of Calendar Year *01-02-2018*	0.00	100.00	32.70	8.75	0.00	0.00
Start of Water Year *09-26-2017*	59.89	40.11	10.08	1.35	0.00	0.00
One Year Ago *03-14-2017*	31.83	68.17	39.34	9.01	0.57	0.00

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

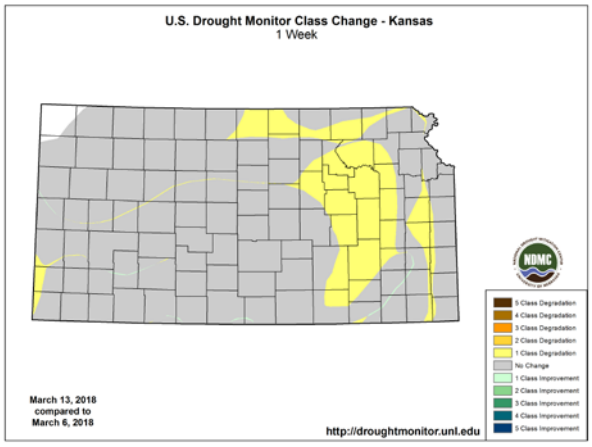
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:

Richard Tinker

CPC/NOAA/NWS/NCEP

http://droughtmonitor.unl.edu/

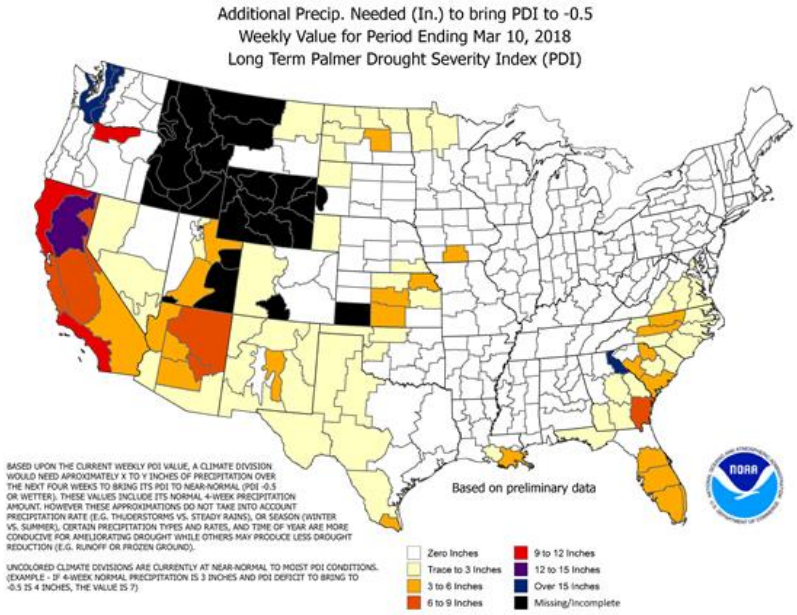


More information on the U.S. Drought Monitor categories can be found at http://droughtmonitor.unl.edu/AboutUs/ClassificationScheme.aspx.

Palmer Drought Severity Index (PDSI) - The Palmer Drought Severity Index is an indicator of relative dryness or wetness and is one factor used the U.S. Drought Monitor. The additional precipitation map indicates the inches of precipitation needed to be out of drought.

More information on the PDSI can be found at http://www.cpc.ncep.noaa.gov/products/monitoring_and_data/drought.shtml

Long-term PDI Precipitation needed to remove drought for weeks ending on date		
Climate Division	Mar 3	Mar 10
North Central	1.64	2.07
Northeast	3.28	3.76
Central	3.75	4.4
East Central	0.53	0.88
South Central	3.54	4.21
Southwest	unknown	unknown



Federal Disaster Declarations 2018

USDA Secretary makes agricultural disaster designations based on crop losses in a designated county. Disaster designations make emergency (EM) loans available to producers suffering losses in those counties and in counties that are contiguous to a designated county. In addition to EM loan eligibility, other emergency assistance programs, such as Farm Service Agency (FSA) disaster assistance programs, have historically used disaster designations as an eligibility trigger.

Designation may be through set process or using Fast Track Secretarial disaster designations for severe drought. Fast Track for drought provides for a nearly automatic designation when, during the growing season, any portion of a county meets the D2 (Severe Drought) drought intensity value for eight consecutive weeks or a higher drought intensity value for any length of time as reported in the U.S. Drought Monitor.

No USDA drought disasters have been declared in 2018 for Kansas.

Presidential Federal Disasters

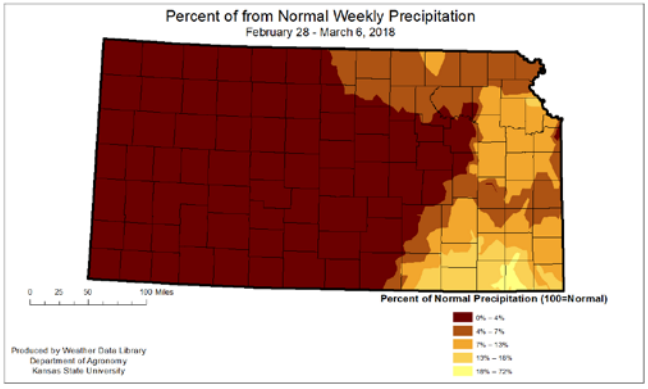
Presidential major disaster declarations must be requested of the President by a governor. A Presidential disaster declaration allows county governments to apply for Public Assistance funds for emergency work and the repair or replacement of disaster-damaged facilities. It also activates the Hazard Mitigation Grant Program statewide for actions taken to prevent or reduce long term risk to life and property from natural hazards.

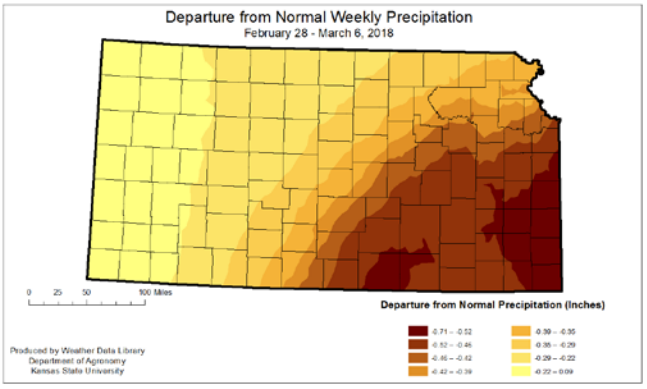
Climate Summary (Precipitation and Temperature)

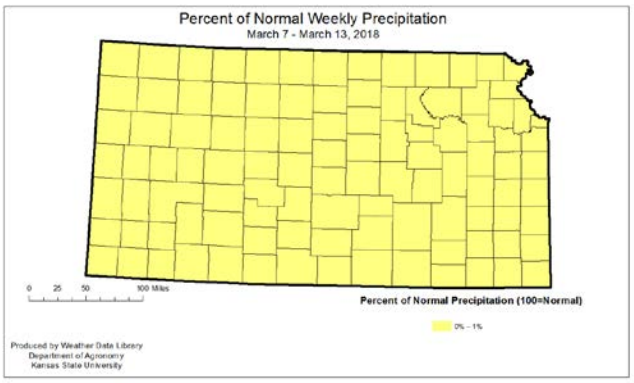
Precipitation summary is provided in the table and maps below from the KSU Weather Library. In addition, weekly maps of precipitation and temperature information can be accessed at http://climate.k-state.edu/maps/weekly/.

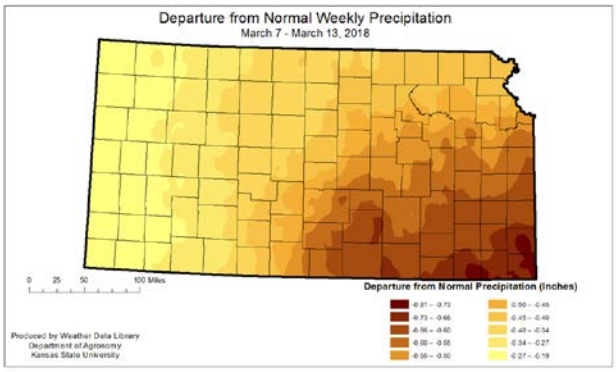
Kansas Climate Division Precipitation Summary (inches)												
Climate Division	March 7-13, 2018			January 1-March 13, 2018			April 1, 2017-March 13, 2018			Sept. 1, 2017-March 13, 2018		
	Actual	Depart Normal	Percent Normal	Actual	Depart Normal	Percent Normal	Actual	Depart Normal	Percent Normal	Actual	Depart Normal	Percent Normal
Northwest	0.01	-0.20	6	0.44	-0.73	36	17.78	-2.45	87	4.11	-1.54	70
West Central	0.00	-0.21	0	0.42	-0.87	34	19.69	0.14	101	5.04	-0.72	88
Southwest	0.00	-0.20	0	0.21	-0.98	18	19.38	0.66	104	3.87	-1.79	70
North Central	0.00	-0.30	0	0.68	-1.05	40	22.73	-3.56	86	5.89	-2.57	69
Central	0.00	-0.36	0	0.72	-1.30	37	21.75	-5.61	80	5.55	-3.28	64
South Central	0.00	-0.46	0	0.62	-1.78	22	25.25	-3.85	86	6.25	-4.00	60
Northeast	0.01	-0.37	3	0.81	-1.45	35	25.11	-7.94	75	5.52	-6.07	48
East Central	0.00	-0.48	0	1.23	-1.47	43	29.77	-5.93	82	6.81	-6.20	50
Southeast	0.06	-0.53	9	2.57	-0.92	70	38.39	-0.59	97	9.64	-5.93	61
STATE	0.01	-0.35	2	0.86	-1.18	36	24.62	-2.96	89	5.90	-3.53	64

Below are the percent of normal precipitation and the departure from normal precipitation for the first two weeks of March. (Maps based data from the Cooperative Observer and Kansas Mesonet, provided by on KSU Weather Data Library.)





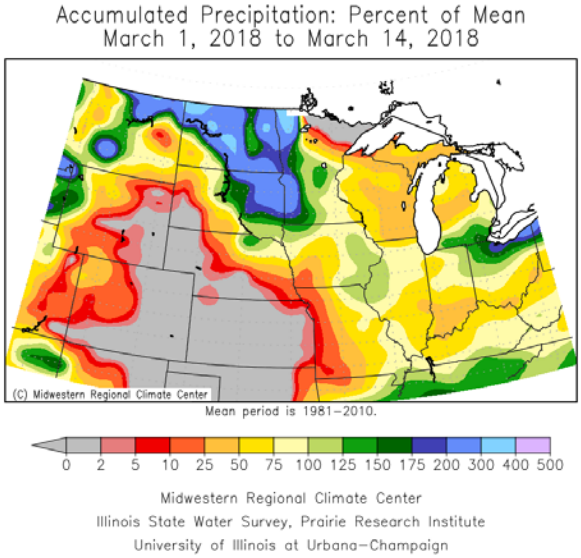




The map on the right quantifies March 2018 precipitation (to-date) showing Kansas and surrounding states. Note Kansas has had no precipitation.

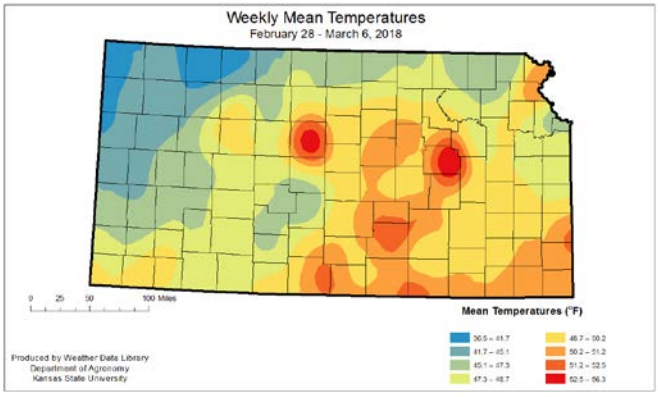
Precipitation maps are also available from the High Plains Regional Climate Center at various time intervals. http://www.hprcc.unl.edu/maps.php?map=ACISClimateMaps.

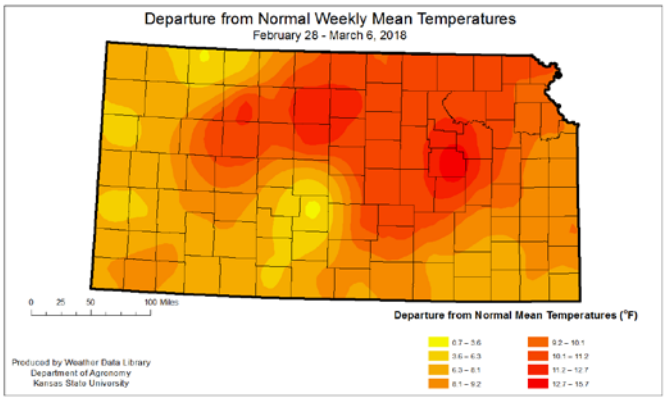
Precipitation summary for the month is provided in the table and maps below from the KSU Weather Library. In addition, weekly maps of precipitation and temperature information can be accessed at http://climate.k-state.edu/maps/weekly/.

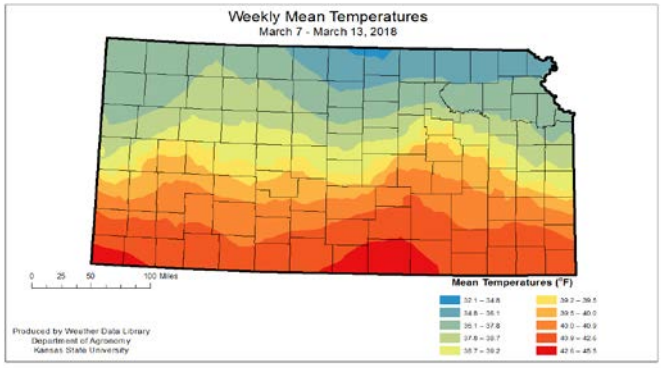


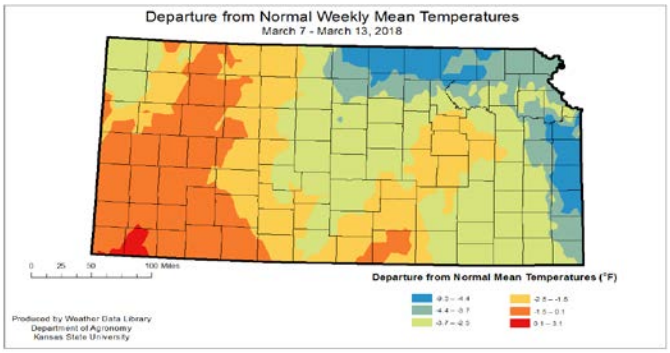
Climate Division	Kansas Climate Division Temperature Summary (°F) March 7-13, 2018							
	Maximum	Minimum	Average	Departure	High	Date	Low	Date
Northwest	54.1	16.9	35.5	-2.9	68	10	11	7
West Central	59.5	18.4	38.9	-0.9	73	9	10	7
Southwest	61.5	21.2	41.4	-1.0	76	10	11	7
North Central	52.1	19.9	36.0	-4.1	73	11	10	8
Central	57.1	20.9	39.0	-2.7	75	10	10	8
South Central	60.0	23.9	41.9	-1.7	78	10	13	13
Northeast	48.1	23.6	35.8	-4.6	64	10	12	8
East Central	51.4	25.9	38.6	-3.1	73	10	15	8
Southeast	54.0	28.0	41.0	-2.9	72	10	18	9
STATE	55.3	22.1	38.7	-2.7	78	10th	10	8th
Data Source: KSU Weather Library								

Below are the weekly mean temperatures and the departure from normal temperatures for the first two weeks of March. (Maps based data from the Cooperative Observer and Kansas Mesonet, provided by on KSU Weather Data Library.)









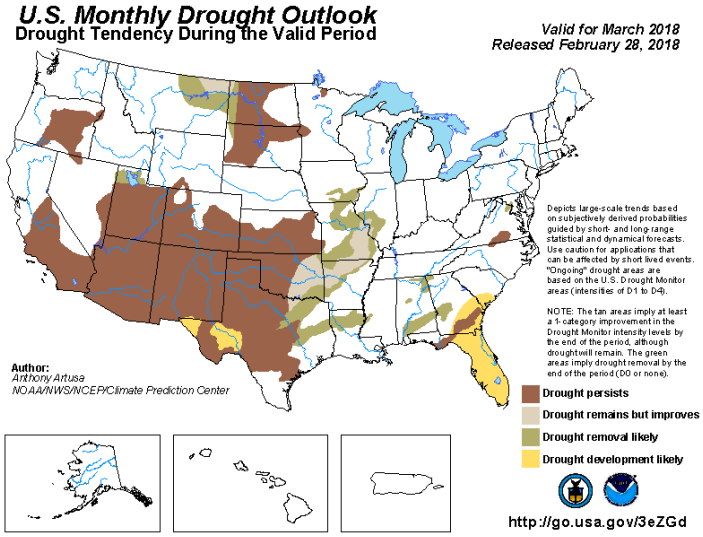
Temperature maps are also available from the High Plains Regional Climate Center at various time intervals. http://www.hprcc.unl.edu/maps.php?map=ACISClimateMaps

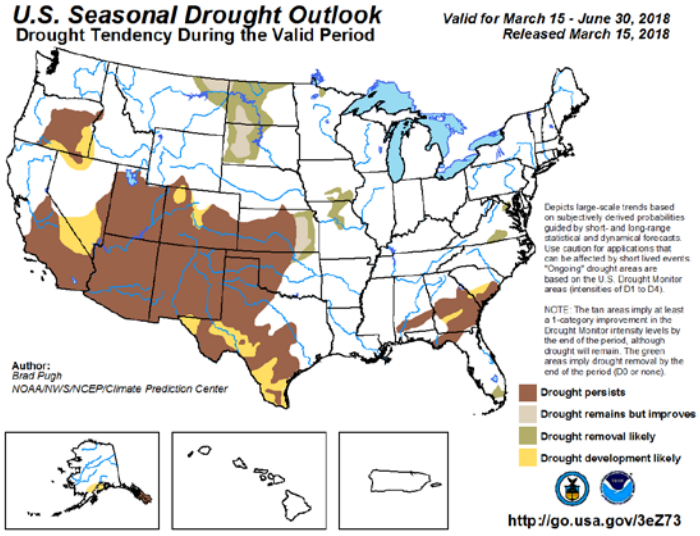
Future Outlook

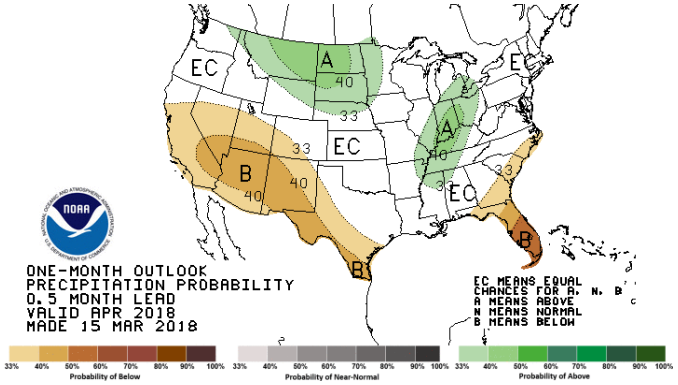
The Monthly Drought Outlook indicates drought conditions to remain in southern and western Kansas. The March outlook has a slight chance for drier than normal conditions state wide, with an increased chance of warmer than normal temperatures. Since March is a critical transition month, that combination is likely to result in further deterioration of the drought conditions. With the wet summer last year and current dryness, increased fire danger continues.

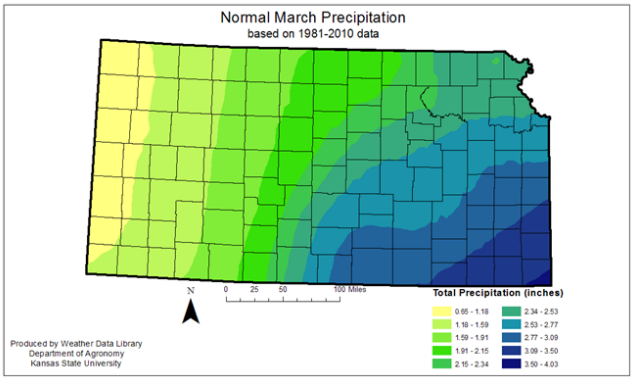
Seasonal Outlook also favors continued drought in south central, central and western Kansas with the east improving. For the March 15-June 30 time period probability favors below normal precipitation and above normal temperatures for western parts of the state. The remaining areas have equal chances of below or above normal precipitation and temperatures for the period.

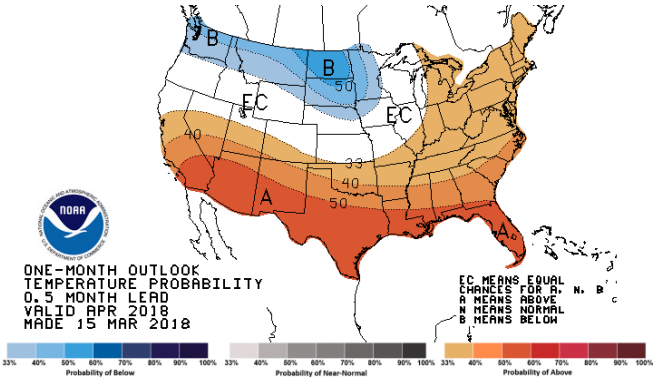
The individual temperature and precipitation outlooks are provided below for the one and three month periods.

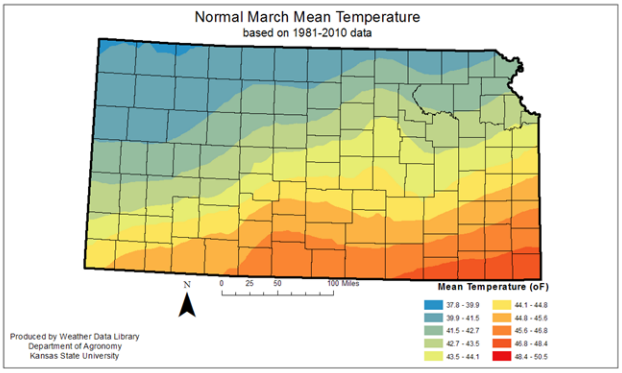


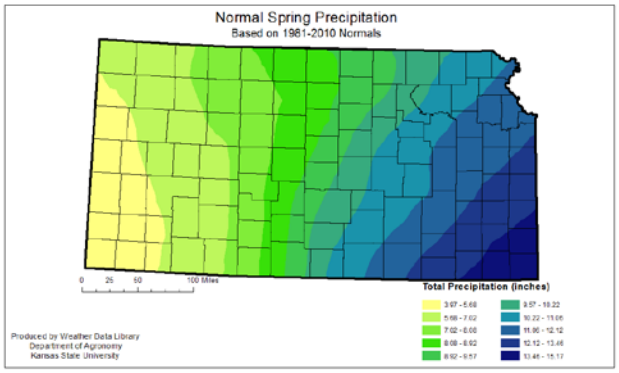


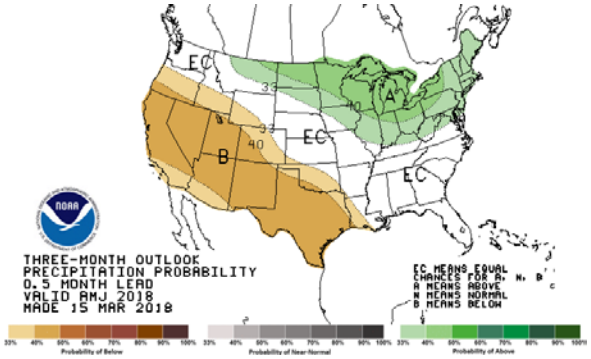


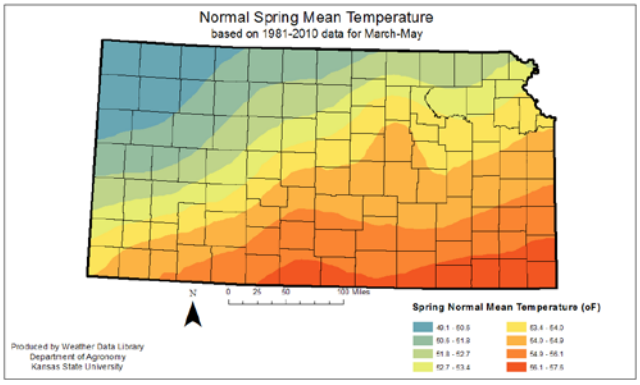


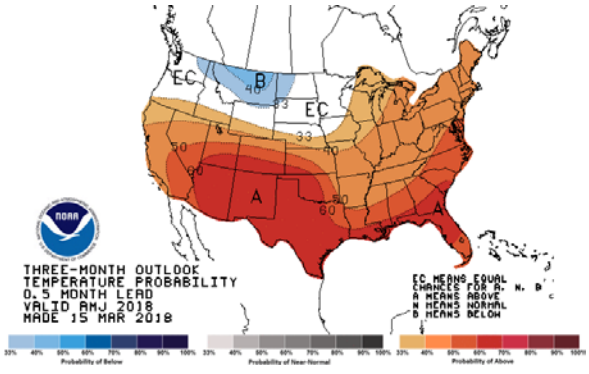












Additional outlooks for various timeframes are available from the national CPC for up to 13 months. (http://www.cpc.ncep.noaa.gov/products/predictions/90day/)

Water

Public Water Supply Conditions
Cities and rural water districts are encouraged to measure their current water supply as well as review and use their conservation and drought emergency plans as needed.

Known issues:
Stage II water restrictions, remain in place under Resolution 03-16 are in place for the **City of Russell,** Russell County water customers as of March 15, 2018 (www.russellcity.org/148/Current-Water-Status). The water restrictions include a prohibition on outdoor watering from 10:00 am to 7:00 pm. It also prohibits the waste of water.

Stage II water restrictions have been in place for the **City of Victoria**, Ellis County since June 2017. No lawn watering or filling of private swimming pools is allowed. Watering of trees, flowers and gardens allowed, but not between 10 am and 5 pm. (March 15, 2018, http://victoriaks.com/utilities.htm.)

Water Emergency currently in place for **Medicine Lodge**, Barber County. Citizens may water before 10 am and after 9 pm.(https://medicinelodge.kansas.gov/ March 15, 2018)

Surface Water Supply Conditions
Kansas River basin: Inflow to Tuttle Creek, Perry, Milford, and Clinton reservoirs remain below normal for March. However, storage in the basin has not been negatively impacted from the abnormally dry conditions in recent months. Clinton is full and the other three reservoirs are below the top of Multipurpose elevation due to planned seasonal drawdowns. That said, the lower seasonal elevations may extend longer than planned if inflow conditions don't improve. Flow in the Kansas River has declined to less than half of historic median levels but remain above the low flow Assurance District and Water Quality flow targets.

Marais des Cygnes basin: Melvern, Pomona, and Hillsdale reservoirs have experienced minimal inflow in recent months. All three reservoirs are also below the top of Multipurpose elevation due to planned seasonal drawdowns and are currently in a slow decline from lack of inflow and minimum release requirements. Flow in the Marais des Cygnes River is well below median values but tributaries appear to be maintaining some contribution.

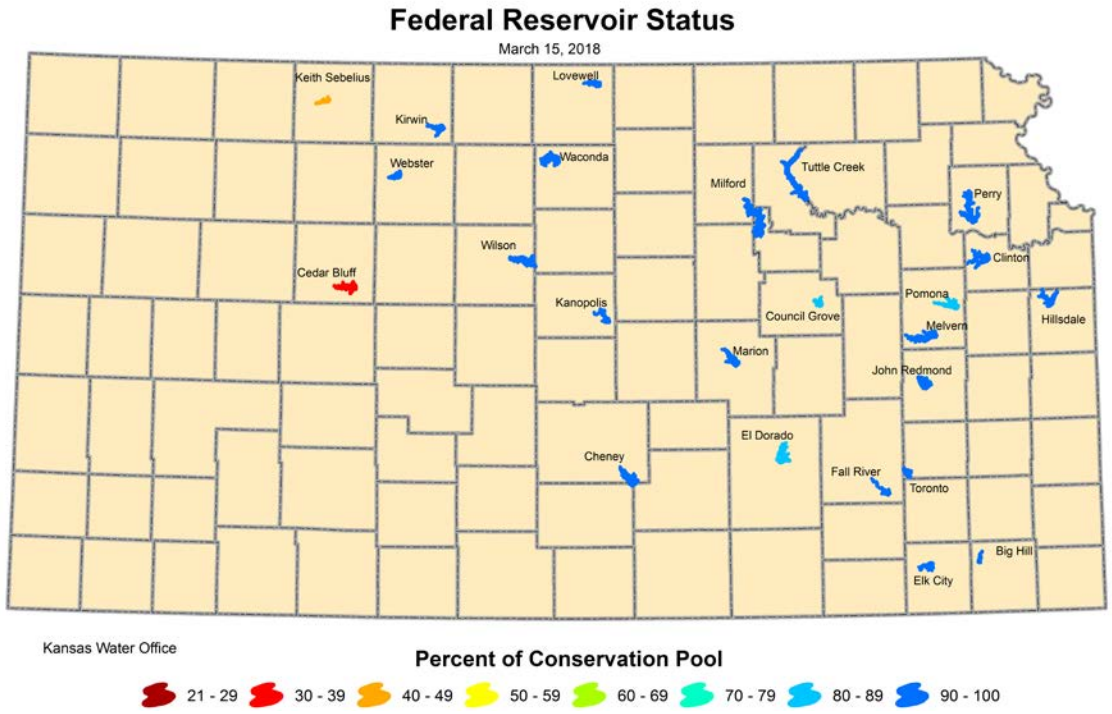
Cottonwood/Neosho basin: Inflows to Marion, Council Grove, and John Redmond reservoirs generally low and streamflow is declining throughout the system. Conservation storage is full in John Redmond but steadily declined in Marion and Council Grove. Releases are necessary to maintain sufficient streamflow in the upper system and releases from John Redmond are necessary to meet the needs of Wolf Creek power plant.

Verdigris basin: Toronto, Fall River, Big Hill and Elk City reservoirs are at or near conservation pool levels; reservoir releases are necessary to supplement low flow conditions of the Fall and Verdigris Rivers. Streamflow throughout the basin are low due to dry conditions but storage is healthy.

Saline basin: The elevation at Wilson Lake is being maintained slightly above normal pool.

Smoky Hill basin: The middle Smoky Hill basin is maintaining near median streamflow. Kanopolis Lake declined throughout December and into the first week of January due to releases necessary to accommodate dam safety inspections. After the inspection the discharge was reduced to 10 cfs and inflows were sufficient to refill conservation storage. In February and March the Corps again released water to lower the pool level for further inspections and work on the service gates. Inflow to Kanopolis is slightly below median historic values and a healthy rain and runoff event will be needed to refill storage to normal pool.

General Reservoir Conditions



Kansas Federal Reservoir Conservation Pool Levels

Reservoir	Top of Multipurpose / Conservation Pool (Feet MSL)	Multipurpose/Conservation Pool Elevation (Feet MSL)	Change from Top of Pool (Feet)	Percent of Conservation Pool Full
Kansas River Basin		**03/15/2018**		
Norton[1]	2304.3	2292.14	-12.16	40.9
Harlan County, NE	1945.73	1939.55	-6.18	75.6
Lovewell[1]	1582.6	1581.47	-1.13	91
Milford[1]	1144.4	1141.55	-2.85	88.7
Cedar Bluff	2144	2117.48	-26.52	29.5
Kanopolis[1]	1463	1462.18	-0.82	95
Wilson[1]	1516	1516.11	0.11	100
Webster[1]	1892.5	1893.89	1.39	100
Kirwin[1]	1729.3	1729.18	-0.12	99.7
Waconda[1]	1455.6	1454.42	-1.18	93.4
Tuttle Creek[1]	1075	1074.42	-0.58	97.6
Perry[1]	891.5	889.46	-2.04	89.9
Clinton[1]	875.5	875.5	0	100
Melvern[1]	1036	1034.58	-1.42	93.6
Pomona[1]	974	971.96	-2.04	86.1
Hillsdale[1]	917	915.39	-1.61	90.4
Arkansas River Basin		**03/13/2018 08:00 AM**		
Cheney	1421.6	1420.70	-0.90	95.0
El Dorado	1339	1335.01	-3.99	82.0
Toronto[1]	901.5	901.76	0.26	100.0
Fall River[1]	948.5	947.73	-0.77	89.0
Elk City[1]	796	796.60	0.60	100.0
Big Hill	858	858.05	0.05	100.0
Council Grove[1]	1274	1272.02	-1.98	88.0
Marion[1]	1350.5	1348.57	0.07	100.0
John Redmond[1]	1039	1041.62	0.62	100.0

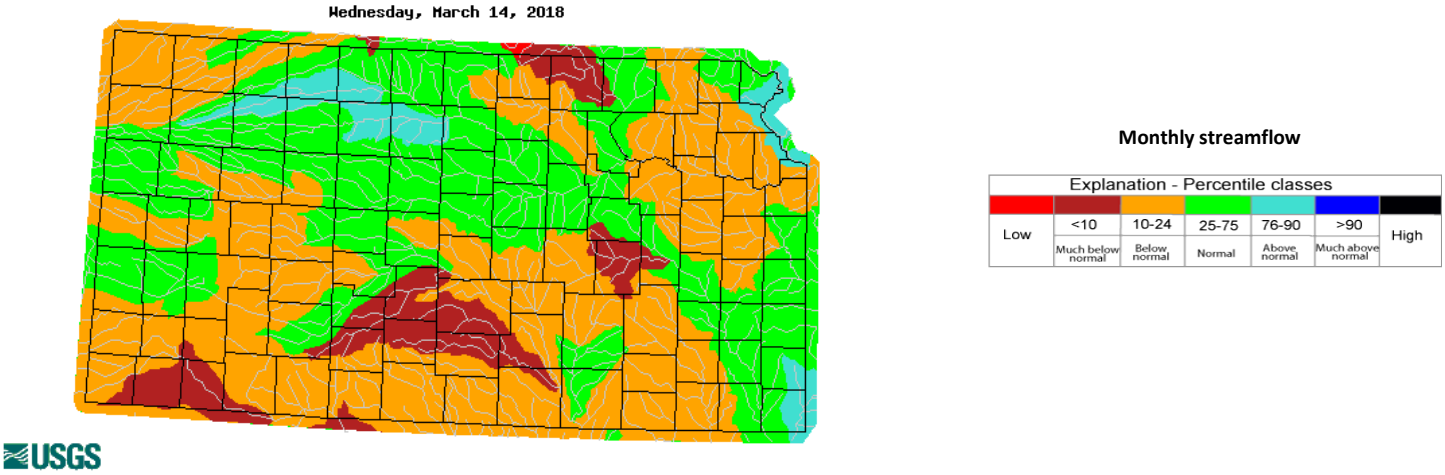
[1]Lake level management plan in place — Source: U.S. Army Corps of Engineers

Note: The conservation pool is the water storage for non-flood purposes of the reservoir, set by the elevation of the top of the pool.

Harmful Blue-Green Algal Blooms (lake water safety)
KDHE issues two levels of public health protection notifications for blue-green algae (BGA) Blooms: a Public Health Watch and Public Health Warning. Public Health Watch–Notifies public that a hazardous condition may exist, that the water may be unsafe for humans and animals and contact with the water is discouraged. Public Health Warning–Notifies public that conditions are unsafe, that contact with the water should not occur, and all conditions of Public Health Watch remain in effect. Warning that conditions are unsafe and water contact should not occur include that no swimming, wading, skiing or consumption of the water should occur. Spring evaluation resumed in March. There are currently no warnings and watches in effect.

Streamflow Conditions
WaterWatch summarizes streamflow conditions in a region (state or hydrologic unit) in terms of the long-term typical condition at stream gages in the region.

14-Day average stream flow compared to historical is reflected in the map below.



In general, a streamflow which is greater than the 75 percentile is considered *above normal*, a streamflow which is between 25 and 75 percentiles is considered *normal* and a streamflow which is less than the 25 percentile is considered *below normal*. Color codes are for basins with streamflow averages less than 25 percent of historic values.

Water Right Administration/Minimum Desirable Streamflow (MDS)
Minimum Desirable Streamflow (MDS) is not being administered in Kansas. MDS administration requires water rights junior to MDS, usually with priority dates after April 12, 1984, to stop diverting water. Administration is ordered when streamflow drops below MDS for more than seven days.

MDS administration occurred during the month, with administration beginning August 10, 2017 on the Little Arkansas River at Alta Mills. The table below provides a snapshot of conditions for streams of interest to the Kansas Department of Agriculture, Division of Water Resources.There are locations where flows are below MDS, but administration is not in effect since there are no junior diversion above each gage.

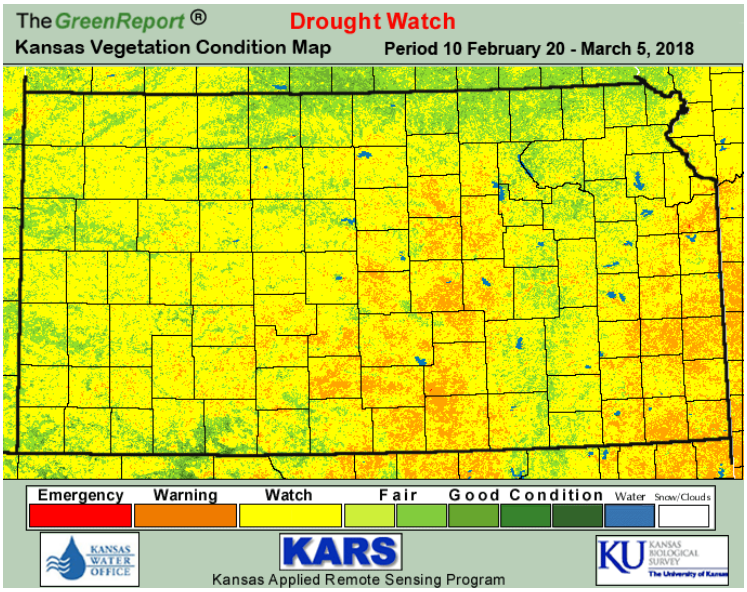
Streamflows as of March 14, 2018			
Gaging Station	**Current Flow**	**Mar MDS**	**Comment**
Republican River at Concordia	Eqp	150	
Republican River at Clay Center	251	200	
Little Blue River near Barnes	150	125	
Mill Creek near Paxico	7	8	Admin pending weekend rains

Delaware River near Muscotah	13	20	Admin pending weekend rains
Rattlesnake Creek near Macksville	0	10	No surface water diversions junior to MDS above gage
Rattlesnake Creek near Zenith	9	15	No surface water diversions junior to MDS above gage
Little Arkansas River at Alta Mills	5	8	MDS admin began Aug 10, 2017
North Fork Ninnescah River above Cheney	57	50	
South Fork Ninnescah River near Pratt	6	10	No surface water diversions junior to MDS above gage
South Fork Ninnescah River near Murdock	105	90	
Whitewater River near Towanda	17.7	15	
Medicine Lodge River near Kiowa	59	60	

Soil, Crop and Vegetation

Kansas Vegetative Conditions

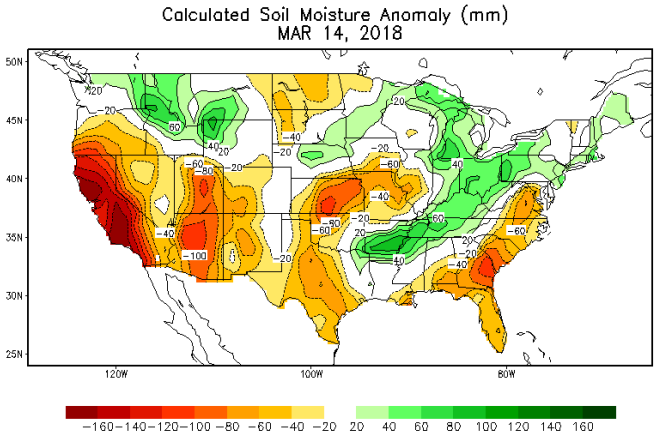
The Kansas Vegetative Condition map (on right) is produced by Kansas Applied Remote Sensing Program using satellite data. Areas in yellow, orange and red indicate areas of vegetative stress.

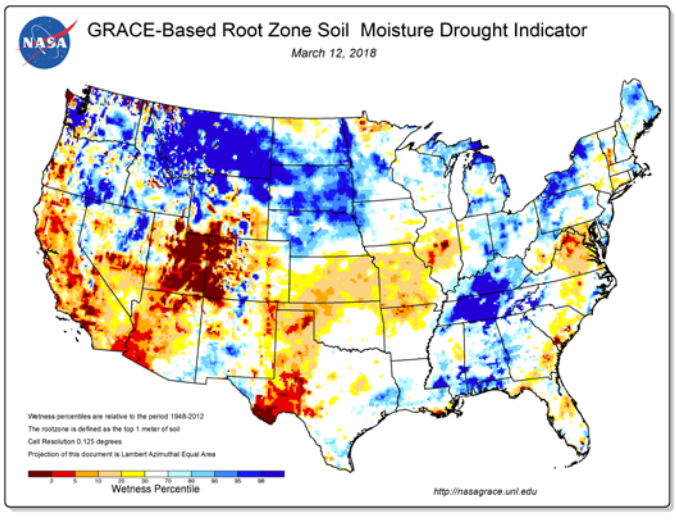


Soil Moisture

The Climate Prediction Center (CPC), also monitors soil moisture and predicts future soil moisture. Anomalies are defined as deviations from the 1971-2000 monthly climatology. The soil anomaly is provided below indicates deficit soil moisture for most of Kansas. (.[http://www.cpc.ncep.noaa.gov/products/Soilmst_Monitoring/US/Soilmst/Soilmst.shtml)](http://www.cpc.ncep.noaa.gov/products/Soilmst_Monitoring/US/Soilmst/Soilmst.shtml)

NASA is generates soil moisture drought indicators each week using GRACE satellite data integrated with other observations. Indicators describe wet or dry conditions as a percentile of probability of occurrence within the period of record (1948-present).

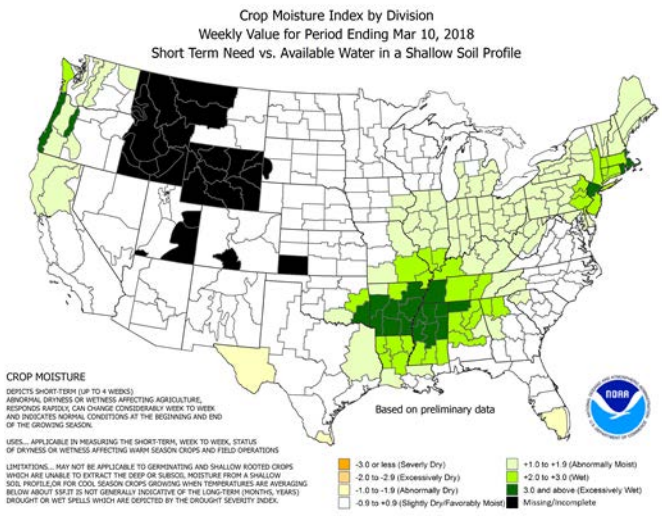




Soil erosion from winds is increased when vegetation is sparse and soils dry as in drought. K-State Research and Extension has publications on mitigating wind erosion.

USDA Crop Progress and Condition provide some indication of the climatic effects on soil, and livestock feed and water supplies. The Kansas report by USDA's National Agricultural Statistics Service for the state as a whole for the week ending March 11, 2018 indicates topsoil moisture supplies rated 48 percent very short, 32 short, 20 adequate, and 0 surplus. Subsoil moisture supplies rated 33 percent very short, 41 short, 26 adequate, and 0 surplus.

Field Crops Report: Winter wheat condition rated 17 percent very poor, 36 poor, 35 fair, 11 good, and 1 excellent.



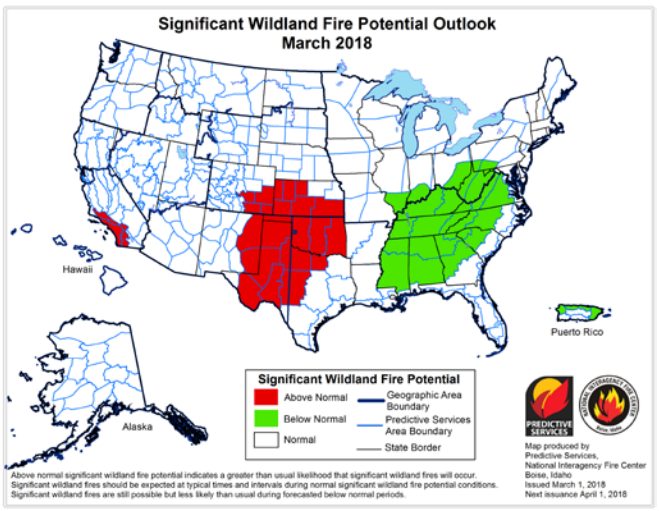
Based on the Palmer Drought Index, the Crop Moisture Index (CMI) uses a meteorological approach to monitor week-to-week crop conditions. It was developed by Palmer (1968) from procedures within the calculation of the PDSI. The CMI was designed to evaluate short-term moisture conditions across major crop-producing regions. It is based on the mean temperature and total precipitation for each week within a climate division, as well as the CMI value from the previous week. The CMI responds rapidly to changing conditions, and it is weighted by location and time so that maps, which commonly display the weekly CMI across the United States, can be used to compare moisture conditions at different locations. Weekly maps of the CMI are available as part of the USDA/JAWF Weekly Weather and Crop Bulletin.

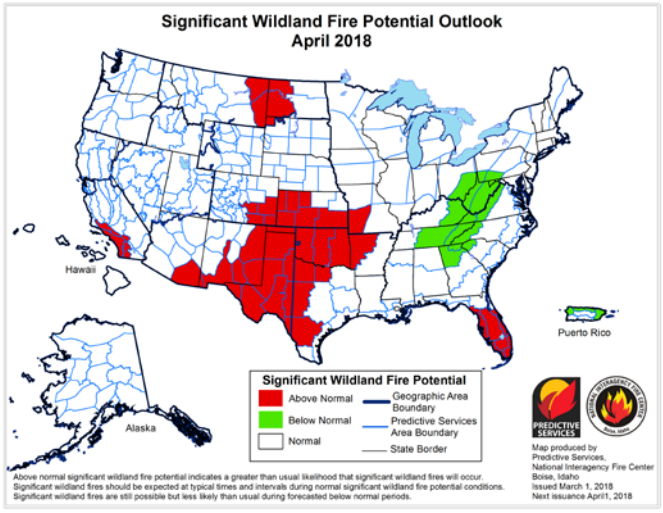
Fire

March conditions resulted in numerous Red Flag warnings alerting citizens to potential increases in wildfire activity due to ideal conditions for wildland fire combustion and rapid spread.

Through March 8, 2018 57 wildfires were reported to Kansas Department of Emergency Management, burning over 27,000 acres statewide. Wildfires also occurred March 8 through 15.

As dry conditions continue, there is an increased potential for wildfire. According to the National Interagency Fire Center, wildfire activity is likely to increase in March in a manner typical to most years beginning in the central through southern Great Plains and the Southwest where preexisting drought conditions and fuel loadings have promoted an environment favorable for Above Normal significant wildland fire potential entering spring.





Kansas Climate Summary

The Kansas Weekly Climate Summary and Drought Report are compiled at least monthly, more frequently when conditions warrant, by the KWO. Information from various federal, state, local and academic sources is used. Some of the data is preliminary and subject to change once final data is available. The KWO web site, KWO Drought, contains additional drought information including links to other agencies with drought information and past issues of the Kansas Climate Summary and Drought Report. Kansas State Climatologist, Mary Knapp, is the primary source of the narrative on weather. She works closely with meteorologists throughout the state and region. Details of current conditions at Evapotranspiration (ET) and Mesonet sites across Kansas are available at http://www.ksre.k-state.edu/wdl/.

RESOURCES and ACTIVITIES

The U.S. Drought Monitor, from the National Drought Mitigation Center at the University of Nebraska-Lincoln, provides a "big picture" perspective of conditions across the nation. In the Kansas county drought stage scheme, a Drought Watch equates roughly to moderate drought in the U.S. Drought Monitor, while a Drought Warning is the equivalent of severe drought. A Drought Emergency is reserved for extreme or exceptional drought. Palmer Drought Severity Index - The Palmer Index (PDSI) is one indicator used in the U.S. Drought Monitor.

The High Plains Regional Climate Center (https://hprcc.unl.edu/)provides precipitation and temperature summary maps.

The U.S. Geological Survey (USGS) Drought Watch provides information average streamflow measured at long-term gaging stations and compares them to normal flows.

The Kansas Department of Agriculture-Division of Water Resources monitors stream flow using the USGS gages for determination of administrative needs. Administration may be needed due to Minimum Desirable Streamflow (MDS) requirements, impairments and reservoir release protection.

The water levels of the federal lakes fluctuate during a year according to the management plan. Lake level Management plans are posted on the Kansas Water Office web site www.kwo.ks.gov.

The Kansas Applied Remote Sensing Program (KARS) at the University of Kansas produces a Kansas Green Report each week during the growing season. For a full set of national and regional ***GreenReport***® maps, go to: http://www.kars.ku.edu/products/greenreport/greenreport.shtml. This Kansas Vegetation Drought Response Index map is developed weekly by the Kansas Biological Survey using state drought triggers as its key. In addition the Vegetation Drought Response Index, by the National Drought Mitigation Center provides another a national perspective on vegetation conditions. VegDRI maps may be found at http://vegdri.unl.edu/

The National Weather Service (NWS) provides fire weather products and services for Kansas that include the Rangeland Fire Danger Index, Fire Weather Forecasts, Red Flag Watches/Warnings and Spot Forecasts. The five NWS offices that serve Kansas websites may be accessed from the NWS Offices' page.

The Seasonal Drought Outlook, developed by the NOAA Climate Prediction Center, assesses the likelihood for improvement, persistence or deterioration in drought conditions for areas currently experiencing drought as identified by the U.S. Drought Monitor. Also see: http://www.ncdc.noaa.gov/oa/climate/research/dm/weekly-dm-animations.html

Responding to Drought: A Guide for City, County and Water System Officials provides an overview of Kansas county drought stage declarations, local planning and coordination, disaster declarations and available state and federal assistance. The 2007 Municipal Water Conservation Plan Guidelines and the Drought Vulnerability Assessment Report, both by KWO, provide guidance regarding drought preparedness and response. These are available at http://kwo.org/reports_publications/Drought.htm

USDA Drought Programs and Assistance website (https://www.usda.gov/topics/disaster/drought/usda-drought-programs-and-assistance) listing the various USDA programs and agencies to assist with drought issues.

The National Interagency Coordination Center in Boise, Idaho, produces wildfire potential outlook maps monthly. (https://www.predictiveservices.nifc.gov/outlooks/outlooks.htm)

Please contact Diane Knowles at the Kansas Water Office (785) 296-3185 or diane.knowles@kwo.ks.gov should you have any questions or suggestions.